Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15 Subpart C

On

Electronic Article Surveillance Detection System

Liberty PX

Prepared for:

Checkpoint Systems Inc.

101 Wolf Drive, P.O. Box 188

Thorofare, NJ 08086

Prepared by:

TUV Rheinland of North America, Inc.

Auftraggeber: *Client:*	Checkpoint Systems Inc. 101 Wolf Drive, P.O. Box 188 Thorofare, NJ 08086	Gregory Sleet 856-384-2339 / 800-257-5540 greg.sleet@checkpt.com	
Bezeichnung: *Identification:*	Electronic Article Surveillance Detection System	**Serien-Nr.:** *Serial No.*	Configuration 1-4
Gegenstand der Prüfung: *Test item:*	Liberty PX	**Prüfdatum:** *Date tested:*	September - October/2008
Prüfort: *Testing location:*	TUV Rheinland of North America 336 Initiative Drive Rochester, NY 14624 U.S.A.		
Prüfgrundlage: *Test specification:*	Emissions: FCC 47 CFR Part 15 & RSS-210 Issue 7		
Prüfergebnis: *Test Result*	**Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. The above product was found to be Compliant to the above test standard(s)**		
geprüft / *tested by:* Randall Masline			
Randall E Masline 5 December 2008 **Datum** *Date* / **Name** *Name* / **Unterschrift** *Signature*			
Sonstiges : *Other Aspects:*	**None**		
Abkürzungen: OK, Pass, Compliant, Complies = entspricht Prüfgrundlage Fail, Not Compliant, Does not Comply = entspricht nicht Prüfgrundlage N/A = nicht anwendbar		Abbreviations: OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable	

FC	NVLAP	**Industry Canada**	**BSMI**
US90575	**200313-0**	**3466C-1**	**SL2-IN-E-050R**

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the requirements of the FCC Part 15 Subpart C, based on the results of testing performed on September - October/2008 on the Electronic Article Surveillance Detection System, Model No. Liberty PX, manufactured by Checkpoint Systems Inc.. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 *Summary of Test Results*

Applicant	Checkpoint Systems Inc. 101 Wolf Drive, P.O. Box 188 Thorofare, NJ 08086	**Tel**	856-384-2339	**Contact**	Gregory Sleet
		Fax	800-257-5540	**e-mail**	greg.sleet@checkpt.com

Description	Electronic Article Surveillance Detection System	**Model Number**	Liberty PX
Serial Number	Configuration 1-4	**Test Voltage/Freq.**	120VAC/60Hz
Test Date Completed:	September - October/2008	**Test Engineer**	Randall Masline

Test Methods	Test	Test Parameters	Measurement	Test Result
FCC Part 15.209	Radiated Emissions	Class B, 30 - 1000 MHz	Limit	**Complies**
FCC Part 15.207	Conducted Emissions	Class B, 150kHz - 30MHz	Limit	**Complies**
FCC Part 15.231(a)(2) & RSS A1.1.1(b)	Deactivation of transmitter	Deactivation within 5 seconds	1.78 Seconds	**Complies**
FCC Part15.231(c) & RSS-210 A1.1.3	20 dB Bandwidth 99% Bandwidth	Containment of 20dB Bandwidth		**Complies**
FCC Part 15.231(b)(2) & RSS-210 A1.1.2	Fundamental Frequency Field Strength	6041.6µV or 75.62dBµV/m @ 315 MHz	73.95 dBµV	**Complies**
FCC Part 15.231(b)(3) & RSS-210 A1.1.2	Spurious Emission Field Strength	6041.6µV or 55.62dBµV/m		**Complies**
FCC Part 15.231(b)(2) & RSS-210 2.6	Spurious Emissions in Restricted Bands	Table FCC Part 15.205 Table 1 RSS-210		**Complies**
FCC Part 15.31(e) & RSS-210 A1.1.4	Frequency Stability & Input Power variations	85% and 115 % of nominal Voltage	93.5 – 126.5 VAC/60Hz	**Complies**
FCC Part 15.223(a) & RSS-210 A1.1.2	Fundamental Frequency Field Strength	90µV/meter at 10 meters	8.2 MHz @ 76.87 dBµV 9.5 MHz @ 71.78 dBµV	**Complies**
FCC Part 15.223(b) & RSS-210 2.6	Spurious Emissions in Restricted Bands	Table FCC Part 15.205 Table 1 RSS-210		**Complies**
FCC Part 15.247 (b)(5) and 1.1310	RF Human Exposure Limit	1.0 (mW/cm2)	Limit	**Complies**

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at 336 Initiative Dr, Rochester NY is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No US90575). The laboratory scope of accreditation includes: Title 47 CFR Part 15, and 18. The accreditation is updated every 3 years.

2.1.2 NIST / NVLAP

Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Standard 17025:2005 (Lab code: 200313-0). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 VCCI

VCCI Accredited test lab. Registration numbers R-1065, C-1120, C-1121

2.1.4 Industry Canada

Registration No.: 3466C-1. The OATS has been accepted by Industry Canada to perform testing to 3 and to 10m, based on the test procedures described in ANSI C63.4-2003.

2.1.5 BSMI

Registration No.: SL2-IN-E-050R. The BSMI accreditation was obtained by NIST MRA with the BSMI.

2.2 Measurement Uncertainty

General

☐	The estimated combined standard uncertainty for ESD immunity measurements is ± 0.43%.
☐	The estimated combined standard uncertainty for radiated immunity measurements is ± 2.0dB.
☐	The estimated combined standard uncertainty for EFT fast transient immunity measurements is ± 6.0%.
☐	The estimated combined standard uncertainty for surge immunity measurements is ± 5.0%.
☐	The estimated combined standard uncertainty for conducted immunity measurements is ± 2.0 dB.
☐	The estimated combined standard uncertainty for power frequency magnetic field immunity measurements is ± 2.57%.
☐	The estimated combined standard uncertainty for voltage variation and interruption measurements is ± 4.89%.
☒	The estimated combined standard uncertainty for radiated emissions measurements is ± 4.6 dB.
☒	The estimated combined standard uncertainty for conducted emissions measurements is ± 2.6 dB.
☐	The estimated combined standard uncertainty for harmonic current ± 7.27% and flicker measurements is ± 3.87%.

2.3 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

2.4 Measurement Equipment Used

Equipment	Manufacturer	Model #	Ref./Serial #		Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
BiLog	Chase	CBL6112A		2125	N/A	N/A	RI
BiLog	Chase	CBL6111		1169	29-June-07	29-June-09	RE
BiLog	Chase	CBL6111		1170	29-June-07	29-June-09	RE
Horn	EMCO	3115	C025	9512-4630	14-Jun-07	14-Jun-09	RE
Horn	EMCO	3115	C031	9812-5635	7-Feb-08	7-Feb-10	RE
LISN	Schwarzbeck	8121-200	C102	200	15-Jan-08	15-Jan-10	CE
LISN	Schwarzbeck	8121-131	C111	131	20-Dec-07	20-Dec-09	CE
LISN	Schwarzbeck	8121-128	C114	128	24-Jul-08	24-Jul-10	CE
ESD Gun	Schaffner	NSG 435	C200	1495	22-Jul-08	22-Jul-09	ESD
Precision Power Source	California Instruments	MDL 225500L/5	C210		N/A	N/A	HAR, FLI, VDSI
Power Analyzer	Voltech	PM3000A	C211	8992	6-May-08	6-May-09	FLI
Wideband (.01-230)	IFI	M75	C212	A295-0497	N/A	N/A	CI
Signal Generator	Marconi	2024	C213	112223122	19-Dec-07	19-Dec-08	RI
Signal Generator	HP	8657A	C214	312A04354	19-Dec-07	19-Dec-08	CI
Power Meter	HP	437B	C215	3125010240	19-Dec-07	19-Dec-08	CI
Power Supply & Control Module	IFI	PS 5000/28/40	C219	049-4146	N/A	N/A	RI
Wideband Amp (.01-1000)	IFI	M5580	C220	0492-4146	N/A	N/A	RI
Coupling Decoupling 1 PH	FCC	FCC-801-M3-32	C221	106	07-Jan-08	07-Jan-09	CI
Attenuator 6dB (0-1000MHz) 100W	JFW		C223		N/A	N/A	CI
Directional Coupler		62630	C224	5326	N/A	N/A	CI
CDN Adapter Kit	FCC	801-150-50 CDN	C225	752/753	04-Jan-08	04-Jan-09	CI
Calibration Fixture	FCC	801-2031-CF	C226	135	03-Jan-08	03-Jan-09	CI
EM Injection Clamp	FCC	F-2031	C227	259	03-Jan-08	03-Jan-09	CI
PS/Control Module	IFI	5000/28/40	C228	2245-1296	N/A	N/A	RI
Wideband Amp	IFI	CMX5001	C229	2244-1296	N/A	N/A	RI
Leveling PreAmplifier	IFI	LPA-5B	C230	2265-1296	N/A	N/A	RI

Field Monitor	Amplifier Research	FM5004		308114	N/A	N/A	RI
RF 900MHz Pulse Modulator	Schaffner	CPM9830	C240	1026	N/A	N/A	RI
Induction Coil (2.0m x 2.6m)	Haefely		C241		N/A	N/A	MF
Magnetic Field Test System	Haefely	MAG 100.1	C243	080-136-03	N/A	N/A	MF
Triaxial Field Meter	F.W.BELL	4080	C244		25-Apr-07	25-Apr-09	MF
Directional Coupler 0.8-4.2GHz	Amplifier Research	DC7144A	C251	307343	N/A	N/A	RI
Digitizing Oscilloscope 1GHz	Tektronix	TDS 784C	C254	B010847	17 Dec-07	17 Dec-08	SI, EFT VDSI
Field sensor	Amplifier Research	FP6001	C255	305319	6 Jun 08	6 Jun 09	RI
Power Sensor (100KHz-4.2GHz)	Agilent	8482A	C256	MY41093835	18 Dec-07	18 Dec-08	CI
Power Meter	Gigatronics	8541B	C257	1828546	28-May-08	28-May-09	RI
Peak Power Sensor	Gigatronics	80350A	C258	1829770	16-May-08	16-May-09	RI
Coupling Decoupling 2 PH	FCC	FCC-801-M4 -32A	C260	07005	10-Jun-08	10-Jun-09	CI
Coupling Decoupling 1 PH	FCC	FCC-801-M3 -16A	C261	07021	10-Jun-08	10-Jun-09	CI
EMI Receiver	Rohde & Schwarz	ESVS 30	C310	826006/015	19-Dec-07	19-Dec-08	RE
Analyzer w RF Filter Section 85460A	HP	8546A	C311	3325A00127	23-Jul-08	23-Jul-09	RE, CE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESI 40	C320	839283/005	22-Jul-08	22-Jul-09	RE,CE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESIB 40	C321	100180	20-Jan-08	20-Jan-09	RE,CE
EMI Receiver	Rohde & Schwarz	ESHS 30	C323	831954/012	19-Dec-07	19-Dec-08	CE
Multimeter	Fluke	87	C405	49050672	5-May-08	5-May-09	All Tests
Clamp On Meter	Amprobe	RS-3	C410		17-Dec-07	17-Dec-08	MF
Absorbing Clamp	Rohde & Schwarz	MDS-21	C413	76549	10-Sep-07	10-Sep-08	RE
Temp./Humidity Chart Recorder	Honeywell		C418	637592	9-Jan-08	9-Jan-09	RE
Temp./Humidity Chart Recorder	Honeywell		C419	639971	8-Jan-08	8-Jan-09	Re
Passive HV Probe 100X	Fluke	80K-40	C434		24-Jul-08	24-Jul-09	ESD
Oscilloscope	Tektronics	2430	C435	8010532	23-Jul-08	23-Jul-09	EFT
Multimeter	Fluke	83	C437	48162892	24-Jul-08	24-Jul-09	RE
Amplifier (1-26.5 GHz.)	Agilent	8449B	C438	3008A01842	18-Dec-07	18-Dec-08	RE
Amplifier 1 - 18GHz	Rohde & Schwarz	TS-PR18	C439	122002/001	18-Jan-08	18-Jan-10	RE

Signal Generator (10M-40GHz)	Rohde & Schwarz	SMR40	C440	100195	19-Dec-07	19-Dec-08	RI
Amplifier (18-26.5GHz)	Rohde & Schwarz	TS-PR18	C443	100005	22-Jul-08	22-Jul-08	RE
Digital Pressure/Temp/RH	Davis	Perception II	C444	40917	08-Jan-08	08-Jan-09	All tests
Multimeter	Fluke	87	C445	59890224	18-Dec-07	18-Dec-08	All tests
Power Analyzer	Voltech	PM6000	C446	100006700195	13-Dec-07	13-Dec-08	HAR, FLI, VDSI
Analyzer w RF Filter Section 85460A	HP	8546A	D004	3625A00356	23-Jul-08	23-Jul-08	RE, CE
ESD Gun	Schaffner	NSG 435	D005	1891	12 Dec-07	12 Dec-08	ESD
Fast Transient / Burst Generator	Schaffner	NSG2025	D007	109	18-Sep-07	18-Sep-08	EFT
Surge Immunity Test System	Schaffner	NSG2050	D008	199930-007SC	29-Sep-08	29-Sep-09	SI
Pulse Coupling Network	Schaffner	CDN 133	D009	552	29-Sep-08	29-Sep-09	SI

Note: CE = Conducted Emissions, CI= Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD = Electrostatic Discharge, FLI=Flicker, HAR=Harmonics, MF=Magnetic Field Immunity, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions

3 Product Information

3.1 Product Description

The liberty PX system is an Electronic Article Surveillance System (EAS). The systems detect target tags attached to merchandise. The target tags resonate in the region of 8.2 to 9.5 MHz. When the article of merchandise is purchased the target tag is deactivated which causes it to no longer resonate.

3.2 Equipment Modifications

Modifications were needed to bring product into compliance.

See Appendix A for list of EUT modifications.

3.3 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in appendix A of this report.

The Liberty PX will be tested as part of the Liberty PX family. Only one sample will be tested to represent the whole platform. The Liberty PX can be configured in different frequencies and have either of the additional transmitters. The following configurations shall be tested

Configuration	Description
1	Liberty PX at 8.2MHz and MTC-100 transmitter
2	Liberty PX at 9.5MHz and MTC-100 transmitter
3	Liberty PX at 8.2MHz and WT-100 transmitter
4	Liberty PX at 9.5MHz and WT-100 transmitter

Table 1 – Configuration 1 through 4

4 Emissions

4.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

4.1.1 Over View of Test

Results	**Complies** (as tested per this report)				**Date**	9/3/2008 – 9/11/2008	
Standard	FCC Part 15.209 and FCC Part 15.205						
Product Model	Liberty PX			**Serial#**	Configuration 1-4		
Configuration	See test plan for details						
Test Set-up	Tested on 10m O.A.T.S. placed on turn-table, see test plans for details						
EUT Powered By	120VAC/60Hz	**Temp**	22ºC	**Humidity**	50%	**Pressure**	1011mbar
Frequency Range	30 - 1000 MHz @ 3m						
Criteria	Class B. (Below Limit)		**Perf. Verification**		Readings Under Limit		
Mod. to EUT	None		**Test Performed By**		Randall Masline		

4.1.2 Test Procedure

Radiated and FCC emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30 - 1000 MHz was investigated for radiated emissions.

Radiated emission testing was first performed at a distance of 3 meters in the semi-anechoic chamber in order to identify the specific frequencies for which these measurements will be made on the 10 m OATS at a distance of 3 meters.

4.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

4.1.4 Final Test

All final radiated emissions measurements were below (in compliance) the limits.

4.1.5 Final Tabulated Data

Radiated Emissions Measurements									
Standard:	FCC Part 15.209 (a)				Final		Date:	9/11/2008	
Device Tested:	Checkpoint Configuration 1				3m.		File: .xls	30862168	
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	42.4070	30.90	40.00	-9.10	Complied	Vertical	90	1.00	
2	43.1382	30.50	40.00	-9.50	Complied	Vertical	90	1.00	
3	43.5140	30.20	40.00	-9.80	Complied	Vertical	90	1.00	
4	**56.7883**	**36.90**	**40.00**	**-3.10**	**Complied**	**Vertical**	**90**	**1.00**	**Maximum Emissions**
5	57.3131	23.40	40.00	-16.60	Complied	Vertical	90	1.00	
6	69.0082	30.30	40.00	-9.70	Complied	Vertical	90	1.00	
7	90.8603	30.10	40.00	-9.90	Complied	Vertical	90	1.00	

Table 2 – Radiated Emissions Configuration 1

Radiated Emissions Measurements									
Standard:	FCC Part 15.209 (a)				Final		Date:	9/11/2008	
Device Tested:	Checkpoint Configuration 2				10m.		File: .xls		
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	36.0887	22.70	40.00	-17.30	Complied	Vertical	90	1.00	
2	36.5429	21.30	40.00	-18.70	Complied	Vertical	90	1.00	
3	**56.9913**	**27.90**	**40.00**	**-12.10**	**Complied**	**Vertical**	**90**	**1.00**	**Maximum Emissions**
4	48.1020	25.30	40.00	-14.70	Complied	Vertical	90	1.00	
5	62.2930	23.10	40.00	-16.90	Complied	Vertical	90	1.00	
6	118.0581	20.00	40.00	-20.00	Complied	Vertical	90	1.00	
7	321.9592	23.90	47.00	-23.10	Complied	Vertical	90	1.00	
8	456.1978	29.00	47.00	-18.00	Complied	Vertical	90	1.00	

Table 3 – Radiated Emissions Configuration 2

Radiated Emissions Measurements									
Standard:	EN 55022: 1998 Class B /FCC Part 15.209 (				Final		Date:	9/3/2008	
Device Tested:	Checkpoint Configuration 3				3m.		File: .xls		
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	43.1300	31.00	40.00	-9.00	Complied	Vertical	270	1.00	
2	43.4770	31.40	40.00	-8.60	Complied	Vertical	270	1.00	
3	48.2210	18.20	40.00	-21.80	Complied	Vertical	270	1.00	
4	60.3760	20.80	40.00	-19.20	Complied	Vertical	270	1.00	
5	66.6480	28.10	40.00	-11.90	Complied	Vertical	270	1.00	
6	67.8430	28.30	40.00	-11.70	Complied	Vertical	270	1.00	
7	68.4080	29.70	40.00	-10.30	Complied	Vertical	270	1.00	
8	69.5900	32.50	40.00	-7.50	Complied	Vertical	0	1.00	
9	**81.8420**	**37.00**	**40.00**	**-3.00**	**Complied**	**Vertical**	**0**	**1.00**	**Maximum Emissions**
10	84.0500	32.30	40.00	-7.70	Complied	Vertical	0	1.00	
11	86.2450	32.00	40.00	-8.00	Complied	Vertical	0	1.00	
12	90.8470	34.30	40.00	-5.70	Complied	Vertical	0	1.00	
13	471.2360	32.00	47.00	-15.00	Complied	Vertical	200	1.00	

Table 4 – Radiated Emissions Configuration 3

Radiated Emissions Measurements									
Standard:	EN 55022: 1998 Class B/FCC Part 15.209(a				Final	Date:	9/3/2008		
Device Tested:	Checkpoint Configuration 4				10m	File .xls:			
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Antenna Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	34.4460	22.80	30.00	-7.20	Complied	Vertical	0	1.00	
2	45.0620	19.40	30.00	-10.60	Complied	Vertical	0	1.00	
3	66.4660	22.40	30.00	-7.60	Complied	Vertical	250	1.00	
4	77.9040	18.00	30.00	-12.00	Complied	Vertical	180	1.00	
5	81.7130	27.30	30.00	-2.70	Complied	Vertical	0	1.00	
6	187.4910	28.00	30.00	-2.00	Complied	Vertical	0	1.00	
7	37.2850	21.30	30.00	-8.70	Complied	Horizontal	0	1.00	
8	34.4370	23.00	30.00	-7.00	Complied	Horizontal	0	1.00	
9	45.7510	20.00	30.00	-10.00	Complied	Horizontal	0	1.00	
10	**449.9790**	**35.40**	**37.00**	**-1.60**	**Complied**	**Horizontal**	**0**	**1.00**	**Maximum Emissions**
11	549.9880	35.10	37.00	-1.90	Complied	Horizontal	0	1.00	
12	750.0050	34.70	37.00	-2.30	Complied	Horizontal	0	1.00	

Table 5 – Radiated Emissions Configuration 4

4.2 Deactivation Period of Transmitter FCC Part 15.231(a)(2) and RSS-210 A1.1.1(b)

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

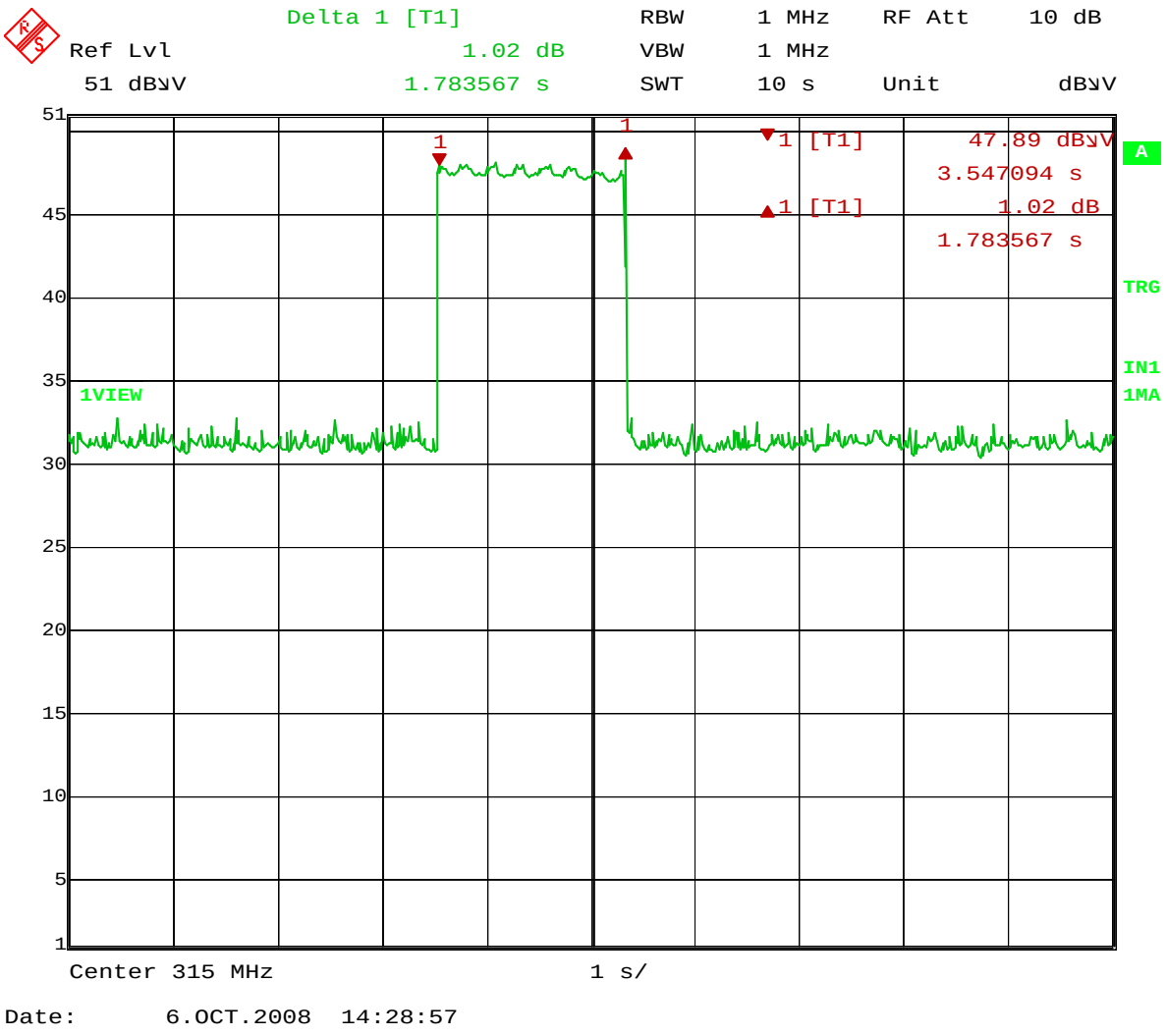

Figure 1

Spectrum Analyzer Parameters:
RBW=1 MHz
Span=0
VBW= 1 MHz
LOG dB/div.= 10dB
Sweep = 10 S

The deactivation of transmitter is 1.78 seconds, which is well below the 5 second requirement. The EUT is compliant to the requirements of 15.231(a)(2) and RSS-210 A1.1.1

4.3 Bandwidth *FCC part 15.231(c)*

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The limit of the bandwidth would be 0.25% of 315 MHz is 787.500 kHz. The measured -20dB bandwidth is 12.42 kHz.

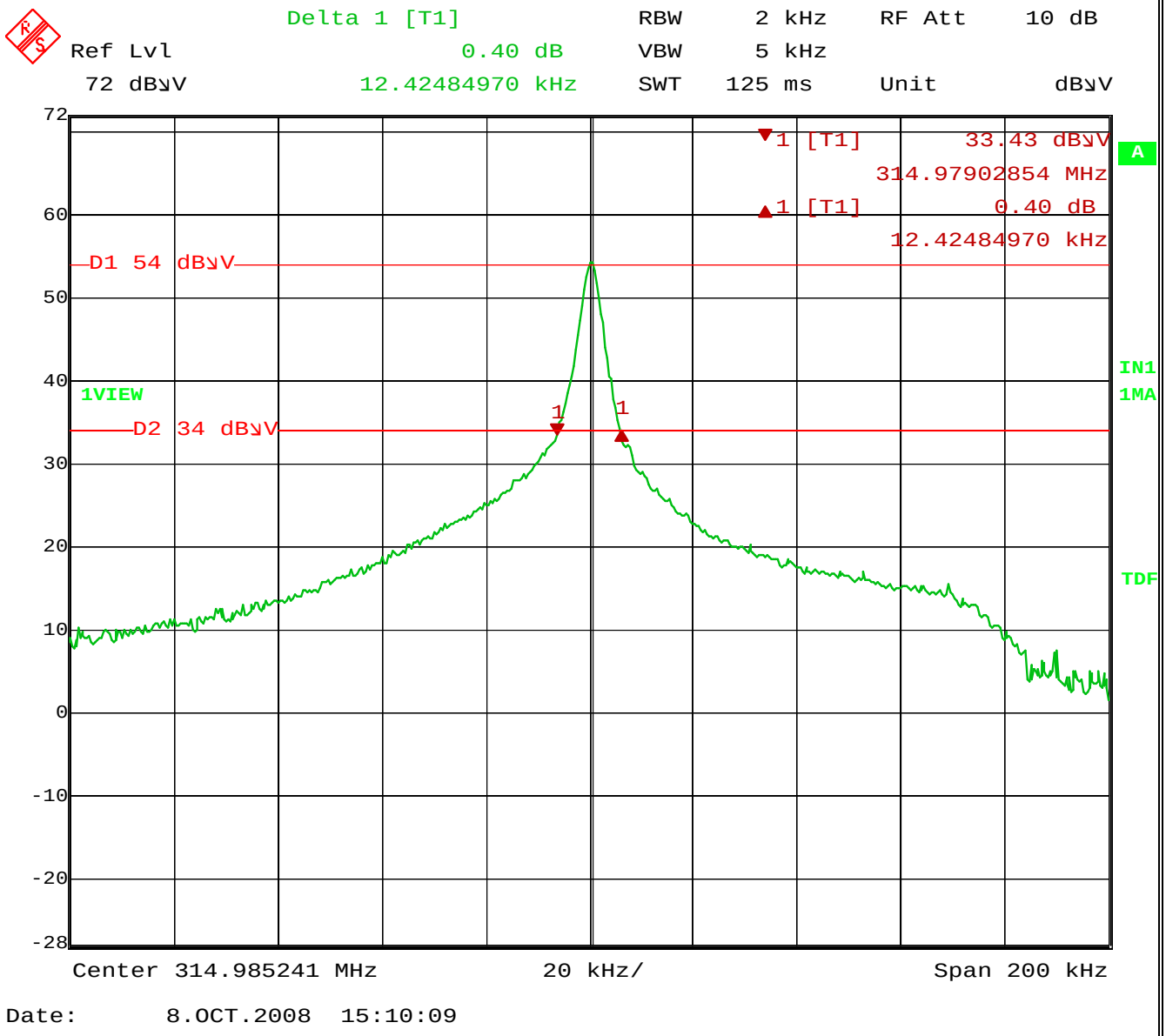

Figure 2

Spectrum Analyzer Parameters:
RBW=100 kHz
Span=1MHz
VBW= 100 kHz
LOG dB/div.= 10dB
Sweep = Auto
Detector = sample detector, max hold

The EUT is compliant to the requirements of part 15.231(c).

4.4 Bandwidth RSS-210 Section A1.1.3

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than .25% of the center frequency for devices operating between 70-900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

Using the procedures of RSS-GEN section 4.6.1, the 500 Hz resolution bandwidth is 1% of the 50 kHz span. The Video bandwidth of 1 kHz was chosen because it was the closest value to the 3x RBW value {600 Hz) that the EMC receiver would accept.

The limit of the bandwidth would be 0.25% of 315MHz is 787.500 kHz. The measured 99% bandwidth is 35.67 kHz.

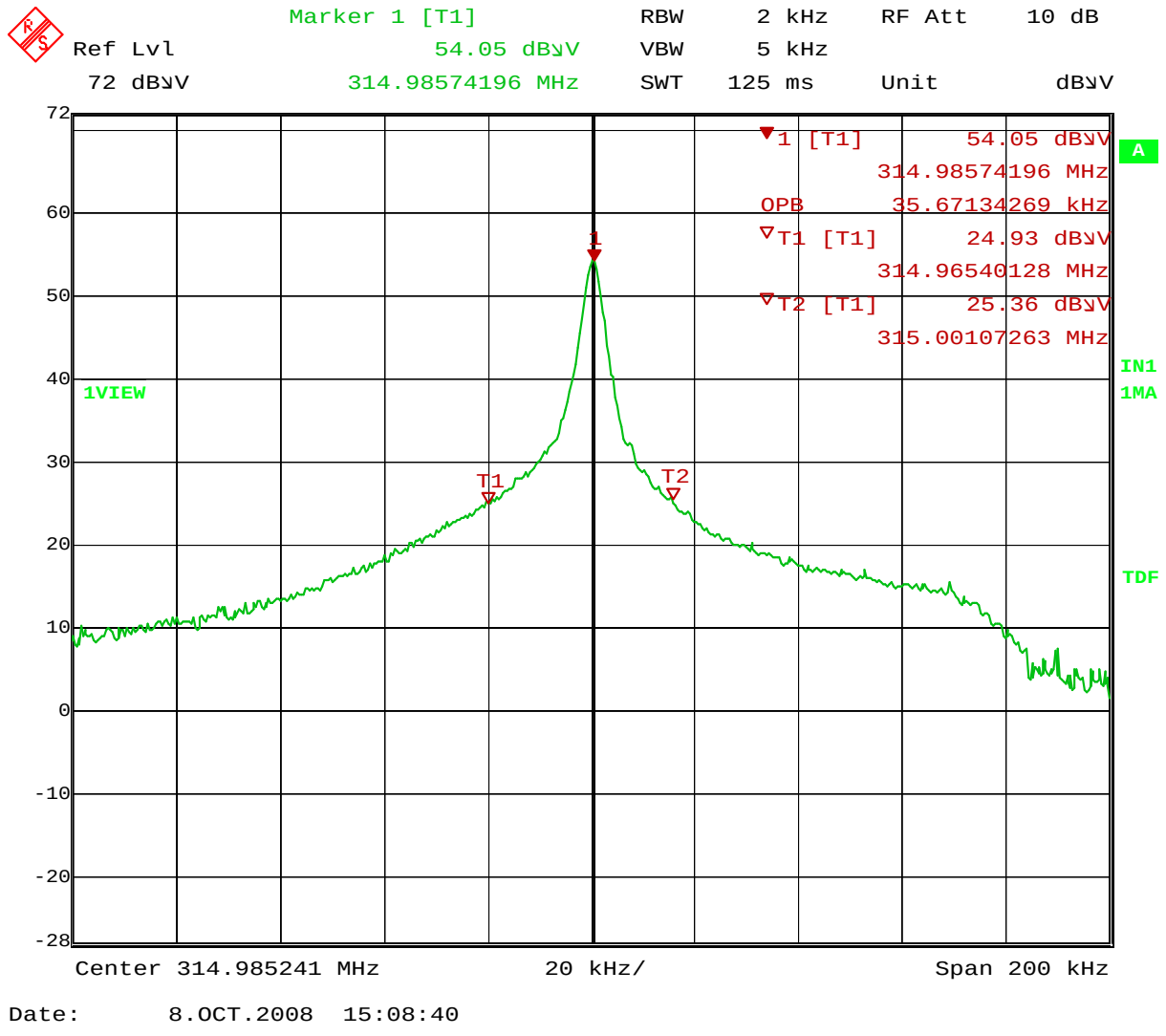

Figure 3

Spectrum Analyzer Parameters:
RBW=500Hz
Span=50kHz
VBW= 1kHz
LOG dB/div.= 10dB
Sweep = Auto
Detector = sample detector, max hold

The EUT is compliant to the requirements of RSS-210 A1.1.3

4.5 Band Edge Compliance Part 15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

The -20dB frequencies of the signal are: 314.979 MHz and 314.991 MHz (6.81 kHz bandwidth)

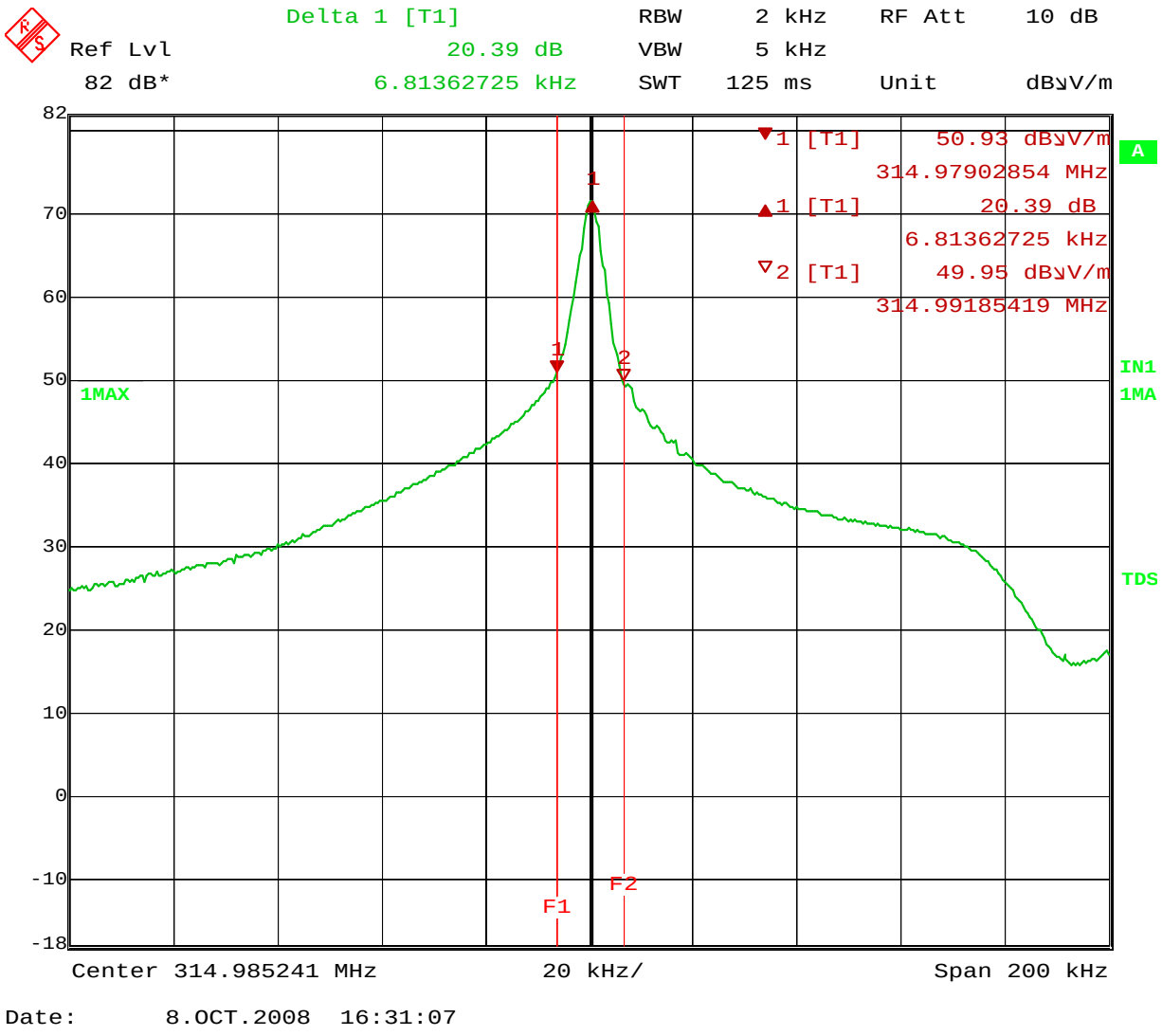

Figure 4

Spectrum Analyzer Parameters:
RBW=500Hz
Span=50kHz
VBW= 1kHz
LOG dB/div.= 10dB
Sweep = Auto
Detector = sample detector, max hold

Both the upper and lower -20dB frequencies are well within the inner 80% of the band. The EUT is compliant to the requirements of part 15.215(c).

4.6 Fundamental Field Strength Part 15.231

Testing was performed in accordance with FCC 47 CFR Part 15 and RSS-210 Issue 7. The limit is derived by linear interpolation of frequency as described in FCC Part 15.231(b) and table 4 of RSS-210.

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	\1\ 1,250 to 3,750	\1\ 125 to 375
174-260	3,750	375
260-470	\1\ 3,750 to 12,500.	\1\ 375 to 1,250
Above 470	12,500	1,250

4.6.1 Deviations

There were no deviations from this test methodology.

For the Fundamental frequency of 315 MHz the limit will be 6,041µV at 3m, which is equivalent to 75.62dBµV

Peak Measurements

Frequency (MHz)	Antenna (H/V)	Antenna Height (M)	Table Azimuth	E-Field (dBµV/m)
315	V	1.0	30	85.16
315	H	1.0	30	82.29

Table 6 – Peak fundamental

Average Measurements based on Pulsed Averaging

Frequency (MHz)	Peak E-Field (dBµV/m)	Correction Factor	Corrected Value	Spec Limit (dBµV/m)	Spec Margin (dBµV/m)
315	85.16	**-11.21 dB**	73.95	75.62	-1.67
315	82.29	**-11.21 dB**	71.08	75.62	-4.54

Table 7 – Average Fundamental

Peak Sample calculation Spec Margin = E-Field Value - Limit, E-Field Value = FIM Value - Amp Gain + Cable Loss + ANT Factor ± Uncertainty amp gain, cable loss and antenna factor's are calculated into the measurement Average Sample Calculation Spec Margin = Corrected Value – Limit, Corrected Value = Peak E-Field Value + Correction Factor
Notes: Testing was performed in the 2 orthogonal planes to determine worse case. Calculation for Pulsed devices. Short pulses = 30 pulses at 240 µSec in 100 mSec period Long pulses= 35 pulses at 581 µSec in 100 mSec period Short pulses = 7.2 mSec in 100 mSec = (30 * 240µSec) Long pulses = 20.33 mSec in 100 mSec = (35 * 581µSec) Total on time in 100 mSec: 27.33 mSec = (7.2 + 20.33) Duty Cycle = 27.53 / 100 Duty Cycle = 27.5 % Correction Factor = 20 log (.275) **Correction Factor = -11.21 dB** See plots below for supporting documentation

As originally tested, the EUT was found to be compliant to the requirements of FCC - 15.231(b) and RSS-210 - A1.1.2.

4.7 Spurious Emissions FCC part 15.231(b)(2) and RSS-210 2.6

In accordance with 47 CFR Part 15.209 General radiated emissions limits and In accordance with 47 CFR Part 15.205 restricted bands of operation.
At frequencies equal to or less than 1000 MHz, compliance with the limits in Sec. 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Sec. 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Sec. 15.35 apply to these measurements.

4.7.1 Deviations

There were no deviations from this test methodology.

4.7.2 Test Results

Emission Frequency (MHz)	Ant Polar H/V	Ant Pos (m)	Table Pos (Deg)	E-Field Value (dBuV)	Spec Limit (dBuV/M)	Spec Margin (dB)
Peak Measurements						
630	H	1.0	30	37.6	75.62	-38.02
630	V	1.0	30	39.4	75.62	-36.22
945	H	1.0	30	42.3	75.62	-33.32
945	V	1.0	30	64.0	75.62	-11.62
1260	H	1.0	30	52.7	75.62	-22.92
1260	V	1.0	30	52.6	75.62	-23.02
1890	H	1.0	30	52.5	75.62	-23.12
1890	V	1.0	30	39.7	75.62	-35.92
2205	H	1.0	30	42.2	75.62	-33.42
2205	V	1.0	30	42.0	75.62	-33.62
2520	H	1.0	30	41.4	75.62	-34.22
2520	V	1.0	30	41.3	75.62	-34.32
2835	H	1.0	30	39.2	75.62	-36.42
2835	V	1.0	30	39.1	75.62	-36.52
3150	H	1.0	30	37.2	75.62	-38.42
3150	V	1.0	30	37.0	75.62	-38.62
Average Measurements						
630	H	1.0	30	27.0	55.62	-28.62
630	V	1.0	30	27.0	55.62	-28.62
945	H	1.0	30	30.4	55.62	-25.22
945	V	1.0	30	38.1	55.62	-17.52
1260	H	1.0	30	39.9	55.62	-15.72
1260	V	1.0	30	47.3	55.62	-8.32
1890	**H**	**1.0**	**30**	**52.5**	**55.62**	**-3.2**
1890	V	1.0	30	39.7	55.62	-15.92
2205	H	1.0	30	37.6	55.62	-18.02
2205	V	1.0	30	37.5	55.62	-18.12
2520	H	1.0	30	30.3	55.62	-25.32
2520	V	1.0	30	29.7	55.62	-25.92
2835	H	1.0	30	28.2	55.62	-27.42
2835	V	1.0	30	27.6	55.62	-28.02
3150	H	1.0	30	27.2	55.62	-28.42
3150	V	1.0	30	27.0	55.62	-28.62
Restricted Band Measurements (Average)						
1575	H	1.0	30	52.4	60	-7.6
1575	V	1.0	30	58.1	60	-1.8

Notes: Testing was performed in the 3 orthogonal planes to determine worse case.
The RBW / VBW during measurements above 1GHz was 1 MHz / 3 MHz
The RBW / VBW during measurements below 1GHz was 120 kHz / 300 kHz

75.62 dBµV is equivalent to 6041. 67 µV (the limit for 315MHz per table 4 of RSS-210).

Table 8 – Spurious Emissions

Spectrum Analyzer Parameters: For under 1000 MHz
RBW=120kHz
VBW= 300kHz
LOG dB/div.= 10dB
Sweep = Auto
Detectors = Peak/Average

Spectrum Analyzer Parameters: For above 1000 MHz
RBW=1.0 MHz
VBW= 1.0 MHz
LOG dB/div.= 10dB
Sweep = Auto
Detectors = Peak/Average

Using the provisions of part 15.35 for averaging pulsed emissions and for limiting peak emissions apply. The digital averaging was calculated, and 20dB was added to the Average limit for the Peak emissions requirements of that same part.

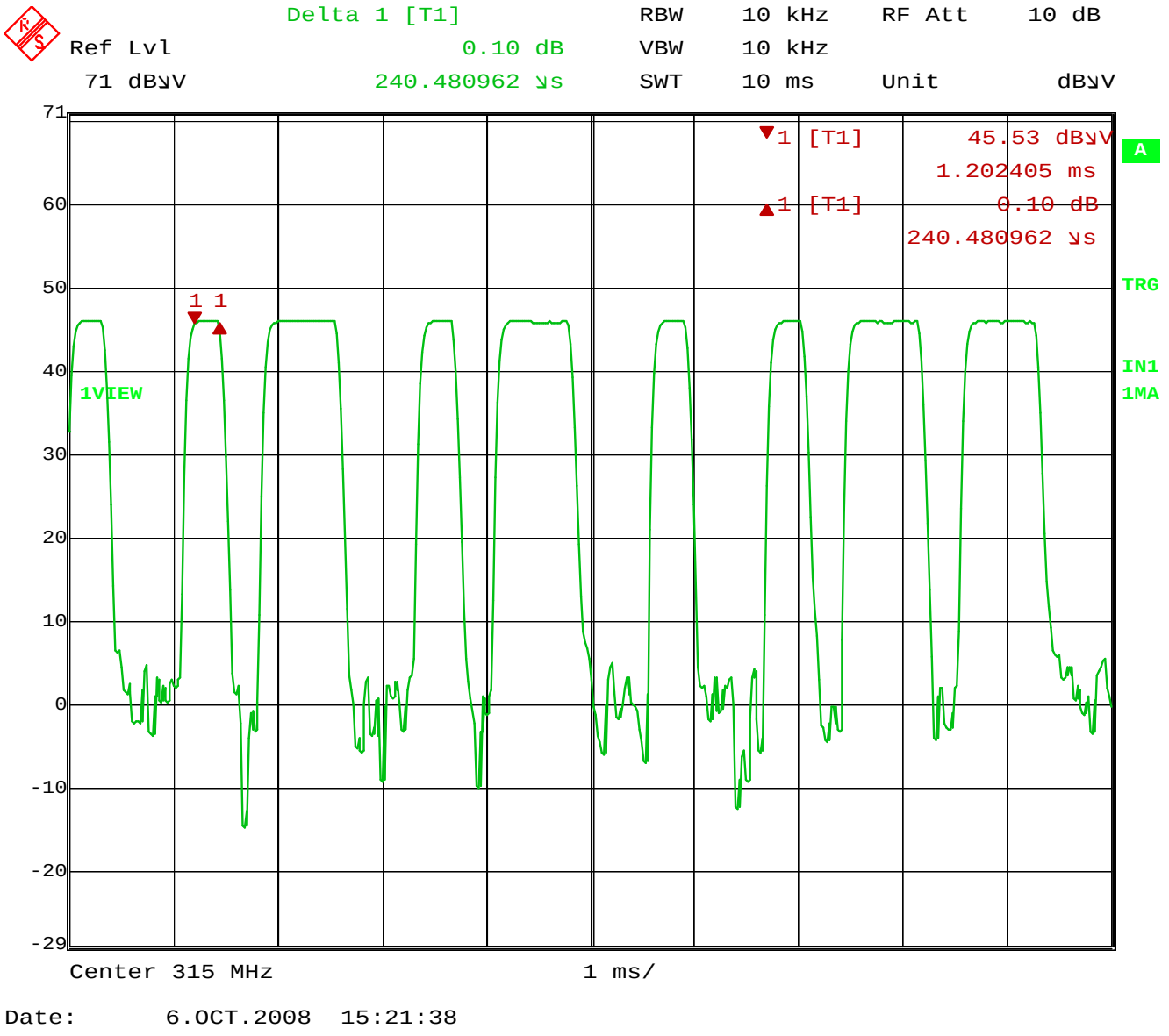

Figure 5 – Short Pulse at 315 MHz are 240µS long

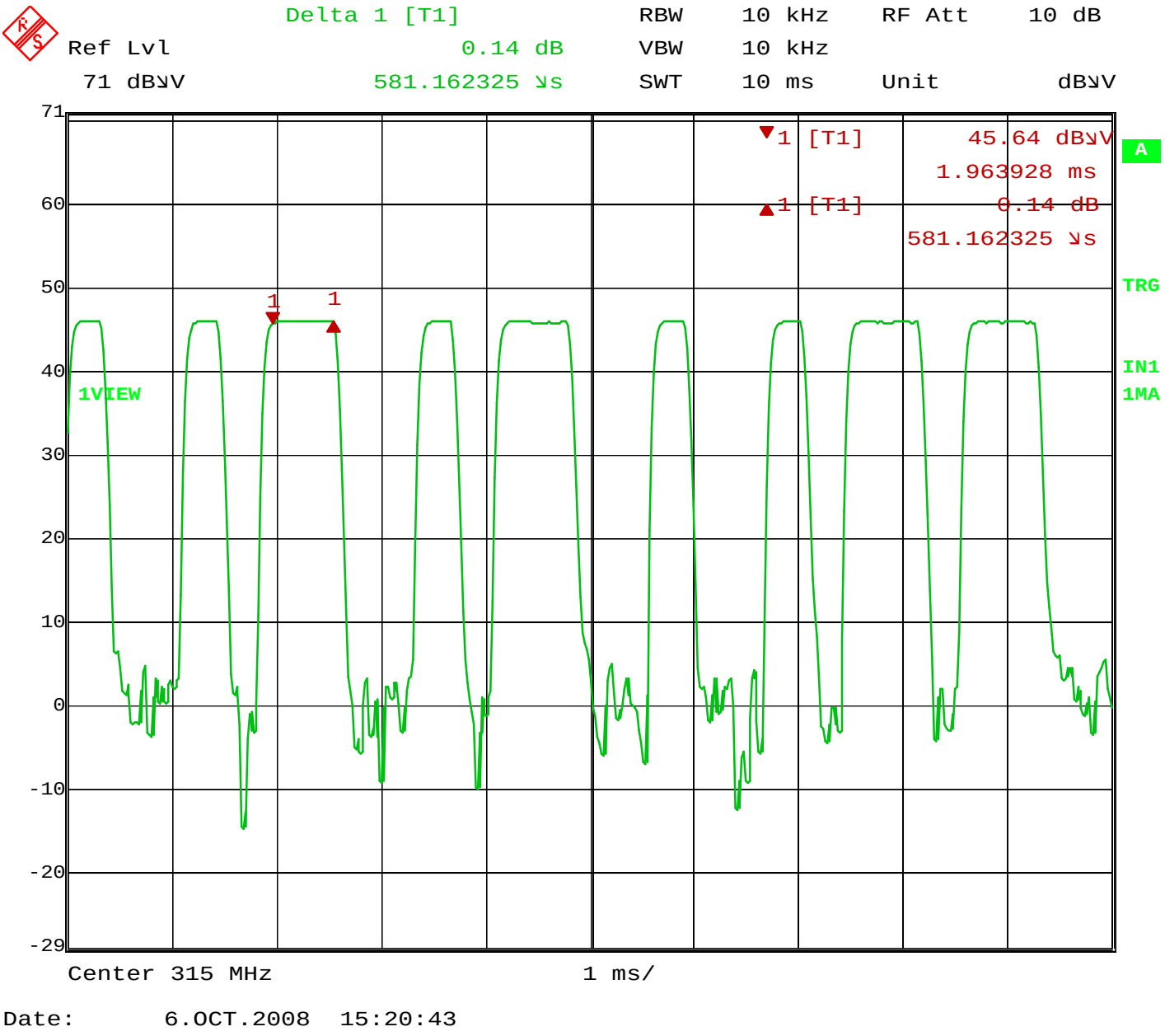

Figure 6 – Long Pulses at 315 MHz are 581µS long

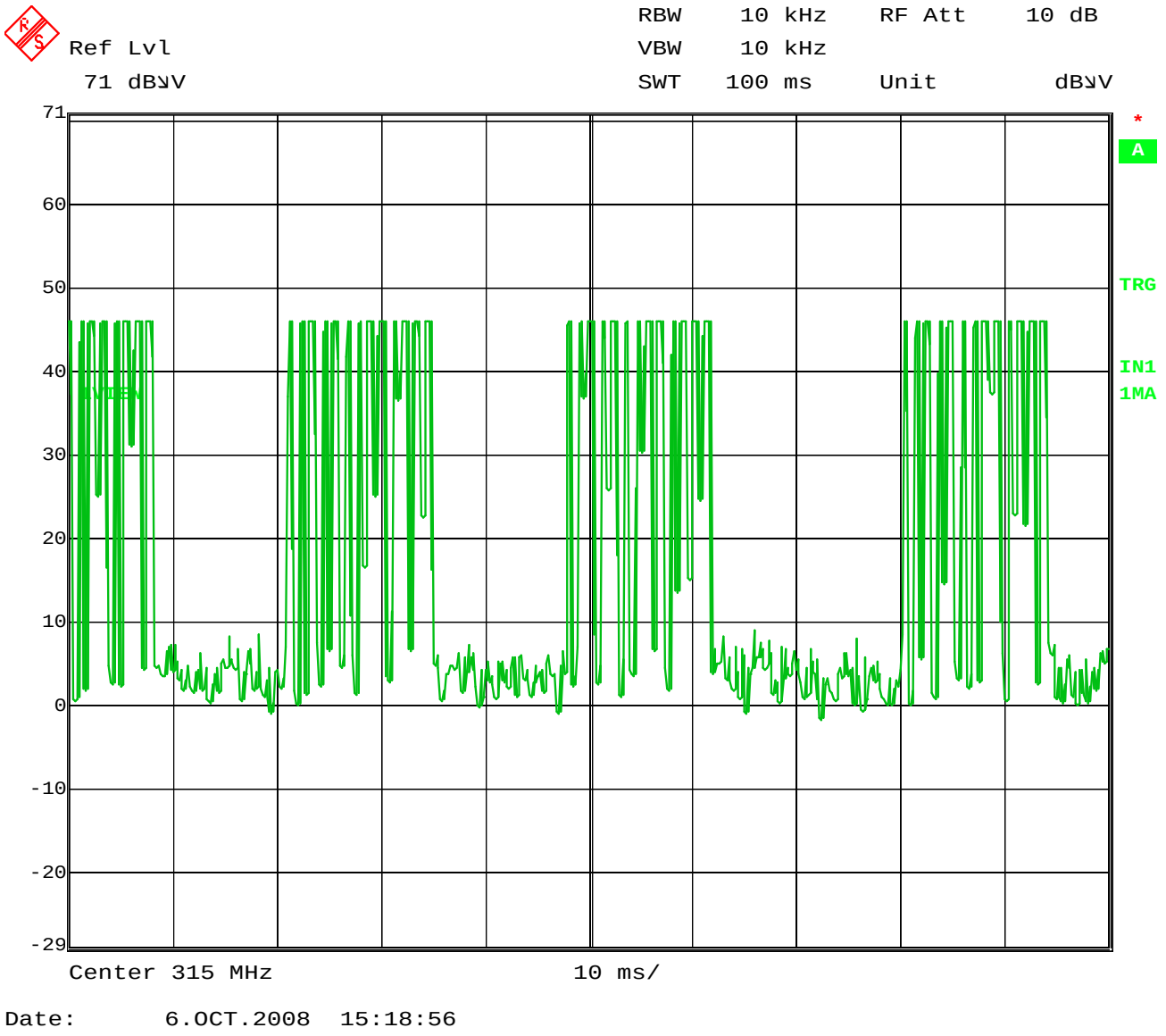

Figure 7 – Pulse Train at 315 MHz = 4 packets in 100ms

4.8 Temperature & Voltage Variations

In accordance with 47 CFR Part 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Frequency Stability Test - Temperature Variations						
Standard:	FCC Part 15.231 d)			*Date:*	8/21/2008	
Device Tested:	Checkpoint - Libtry PX			*File:*	08082104 Volt & Temp Variation.xls	
Mode:	8.2MHz					
Add. Transmitte	MTC-100					
Modifications:	None					
Temperature	**Start-up**	**2min**	**5min**	**10min**		**Results**
-20°C	314.98000	314.98700	314.96700	314.99000		**Complied**
0° C	314.99000	314.98700	314.99000	314.87000		**Complied**
55° C	314.98670	314.99000	314.98700	314.98900		**Complied**
Tested by:	Dieter Baldamus					
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009						
						FCC TempStab.xlt Revised 24APR08

Frequency Stability Test - Voltage Variations						
Standard:	FCC Part 15.225 e)			*Date:*	8/21/2008	
Device Tested:	Checkpoint - Liberty PX			*File:*	08082104 Volt & Temp Variation.xls	
Mode:	8.2MHz					
Add. Transmitte	MTC-100					
Modifications:	None					
Temperature	**Start-up**	**2min**	**5min**	**10min**	**Permitted Band Edge in MHz (+/-0.01%)**	**Results**
New Battery	314.99000	314.98500	315.01500	314.98000	314.9685 - 315.0315	**Complied**
Tested by:	Dieter Baldamus					
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009						
						FCC TempStab.xlt Revised 24APR08

Table 9 – Temperature and Voltage Variations

4.9 Fundamental Field Strength FCC Part 15.223(a)

The field strength of any emission within the band 1.705 – 10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter.

4.9.1 Deviations

In accordance with 15.31(f)(2) at frequencies below 30MHz, measurements may be performed at a distance closer than that specified in the regulations. The result shall be extrapolated by using the square of the inverse linear distance extrapolation factor (40dB/decade)

Testing was performed at 10 meters OATS site where the filed strength limit was reduced from 100µV/meter at 30 meters to 90µV/meter at 10 Meters.

4.9.2 Test Results

The -6 dB bandwidth of the emission at 8.2 MHz was determined to be 1.3 MHz which is greater than the 10% of the center frequency of 820 kHz Bandwidth, Therefore; the maximum emission at 10 meters is 90µV/meter.

The -6 dB bandwidth of the emission at 9.5 MHz was determined to be 1.15 MHz which is greater than the 10% of the center frequency of 950 kHz Bandwidth, Therefore; the maximum emission at 10 meters is 90µV/meter.

Measurement made with average detector and loop antenna at 10 Meters OATS.

Frequency (MHz)	Antenna (H/V)	Antenna Height (M)	Table Azimuth	E-Field (dBµV/m)	Spec limit (dBµV/m)	Spec Margin (dBµV/m)
8.2	V	1.5	0	76.87	90	-14.13

Table 10 – Fundamental of 8.2 MHz

Frequency (MHz)	Antenna (H/V)	Antenna Height (M)	Table Azimuth	E-Field (dBµV/m)	Spec limit (dBµV/m)	Spec Margin (dBµV/m)
9.5	V	1.5	0	71.78	90	-18.22

Table 11 – Fundamental of 9.5 MHz

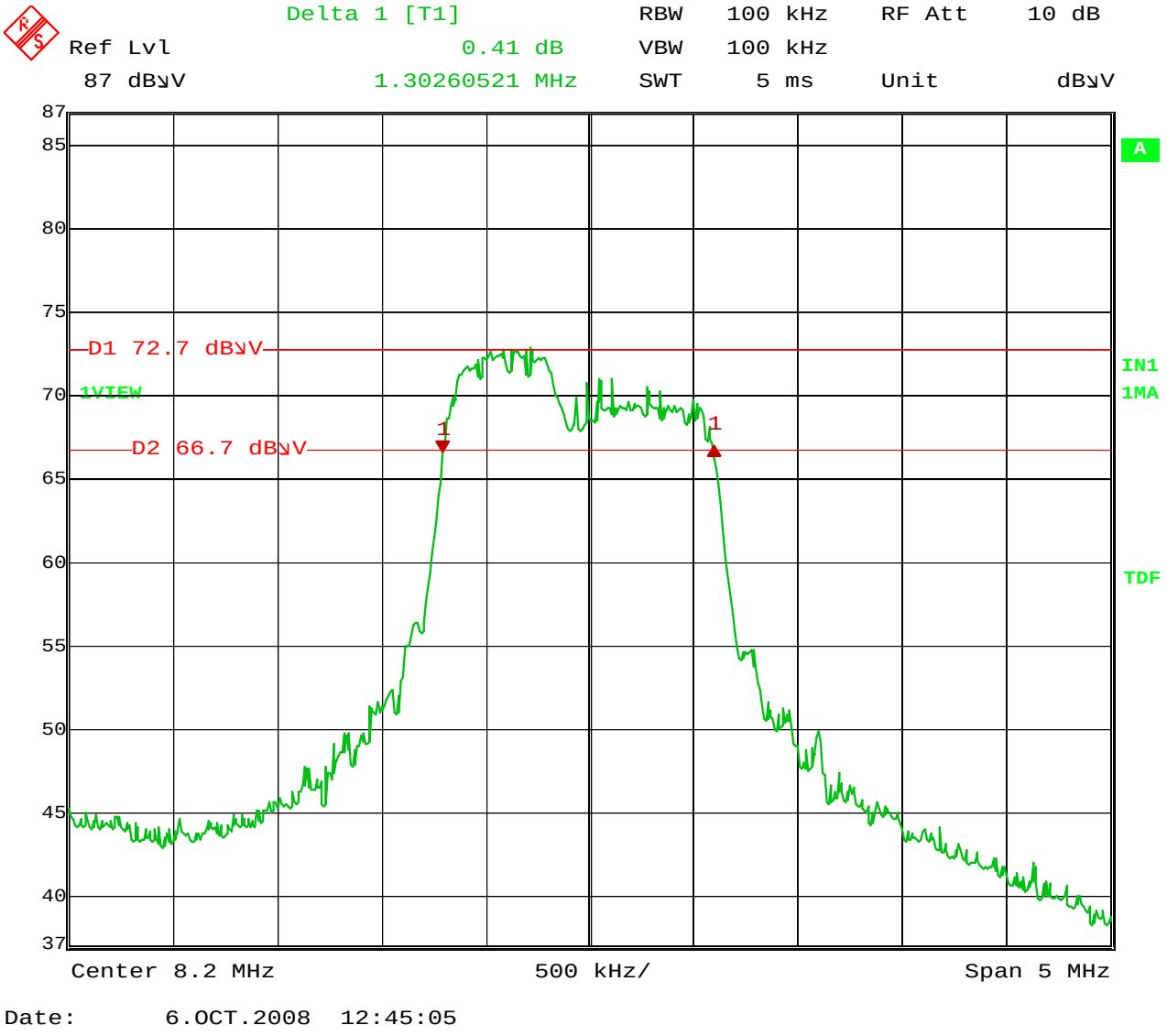

Figure 8 – 8.2 MHz -6dB bandwidth

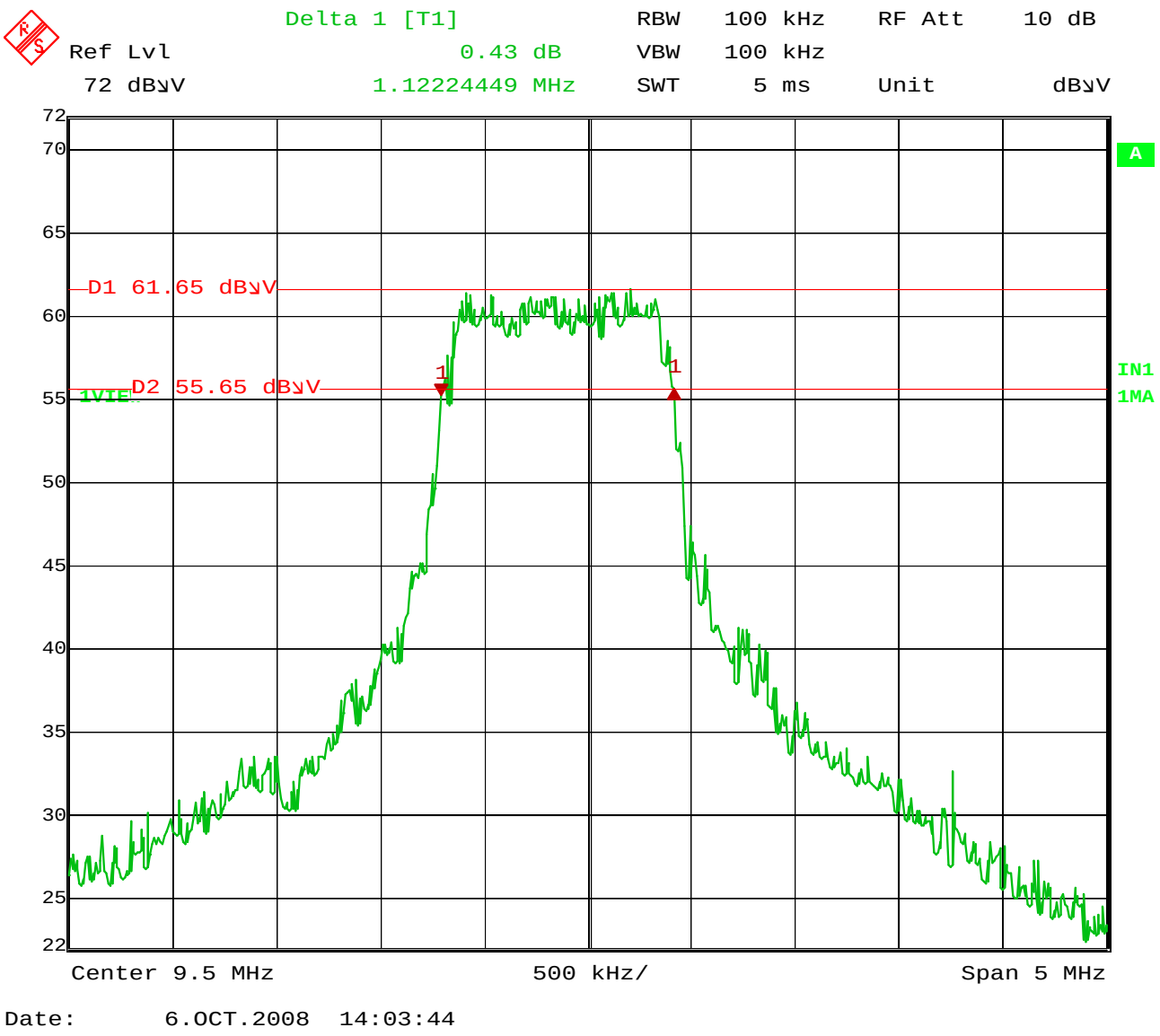

Figure 9 – 9.5 MHz -6dB bandwidth

4.10 RF Human Exposure Limits

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4.10.1 Test Over View

Results	**Complies** (as tested per this report)				**Date**	11/18/208	
Standard	FCC Part 15.231(a)(2) & RSS A1.1.1(b)						
Product Model	Liberty PX			**Serial#**	Configuration **1-4**		
Configuration	See test plan for details						
Test Set-up	Tested in shielded room EUT placed on table						
EUT Powered By	AC/DC Adapter & Batteries	**Temp**	22ºC	**Humidity**	45%	**Pressure**	998mbar
Frequency Range	2.405GHz - 2.480GHz @ 3m						
Perf. Criteria	**1.0 (mW/cm2)** (Below Limit)		**Perf. Verification**		Readings under Limit		
Mod to EUT	None		**Test Performed By**		Randy Masline		

4.10.2 Test Procedure

The maximum input power was measured. Then the minimum distance to the radiator was calculated based on the following formula:

$S=PG/4\Pi r^2 = EIRP/4\Pi r^2$ where:

- P: Power Input to the antenna in mW
- EIRP: Equivalent (effective) isotropic radiated power.
- S: power density mW/cm^2 (1.0 according to the maximum permissible exposure limits (MPE) stated in the FCC standard.
- G: Numeric Gain of antenna relative to isotropic radiator
- r: Distance to centre of radiation in cm $r = \sqrt{PG/4\Pi S}$

4.10.3 Deviations

There were no deviations from the test methodology listed in the test plan.

4.10.4 Final Test

The distance of the antenna is greater than the calculated in r. Therefore the FCC radio frequency exposure limits are not exceeded.

4.10.5 Tabulated Test Data

Transmitter	Freq (MHz)	Measured Peak (dBm)	Duty Cycle Correction	Total Average EIRP (dBm)	Total Average EIRP (µW)	S Max Exposure Limit (mW2/cm)	Under limit	Result
FCC 15.223	8.2	-30.12	0	-30.12	0.9714	1.0	0.0009	**Complies**
FCC 15.223	9.5	-35.22	0	-35.22	0.3006	1.0	0.0009	**Complies**
FCC 15.231	315	-33.05	-11.21	-44.26	0.495	1.0	0.0009	**Complies**

Table 12 – Maximum Permissible Exposure Calculations

Correction Factor for FCC 15.231 Transmitter operating at 315 MHz
Average values were calculated based on the duty cycle of the transmission frequency

Short pulses = 30 pulses at 240 µSec in 100 mSec period
Long pulses= 35 pulses at 581 µSec in 100 mSec period

Short pulses = 7.2 mSec in 100 mSec = (30 * 240µSec)
Long pulses = 20.33 mSec in 100 mSec = (35 * 581µSec)

Total on time in 100 mSec: 27.33 mSec = (7.2 + 20.33)

Duty Cycle = 27.53 / 100
Duty Cycle = 27.5 %
Correction Factor = 20 log (.275)
Correction Factor = -11.21 dB

4.11 Conducted Emissions

This test measures the electromagnet levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other near by electronic equipment.

4.11.1 Over View of Test

Results	**Complies** (as tested per this report)				**Date**	09/09/2008	
Standard	FCC Part 15.209						
Product Model	Liberty PX			**Serial#**	Configuration 1-4		
Configuration	See test plan for details						
Test Set-up	Tested in shielded room EUT placed on table see test plans for details						
EUT Powered By	120VAC/60Hz	**Temp**	22º C	**Humidity**	50%	**Pressure**	1011mbar
Frequency Range	150kHz - 30MHz						
Criteria	Class B (Below Limit)		**Perf. Verification**		Readings Under Limit for L1 and L2		
Mod. to EUT	None		**Test Performed By**		Randall Masline		

4.11.2 Test Procedure

Conducted and FCC emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 150kHz - 30MHz was investigated for conducted emissions.

Conducted Emissions measurements were performed in the shielded room using procedures specified in the test plan and standard.

4.11.3 Deviations

There were no deviations from the test methodology listed in the test plan for the conducted emission test.

4.11.4 Final Test

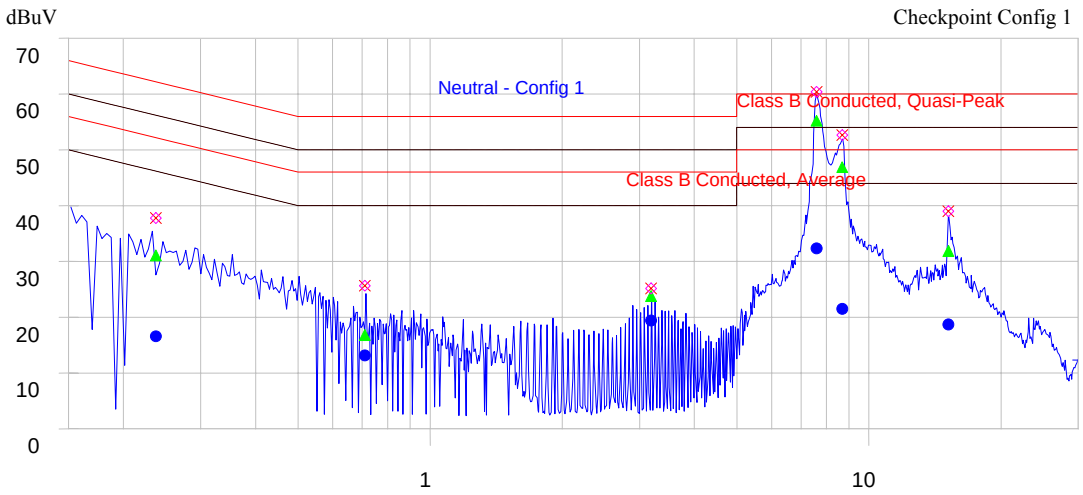
All final conducted emissions measurements were below (in compliance) the limits. Only configurations 1 and 2 were tested as they are the same as configuration 3 and 4. MCT-100 and WT-100 are both battery operated.

4.11.5 Final Graphs

NOTES:

Conducted Emissions @ 120V/60Hz
Line / Neutral

Neutral - Configuration 1



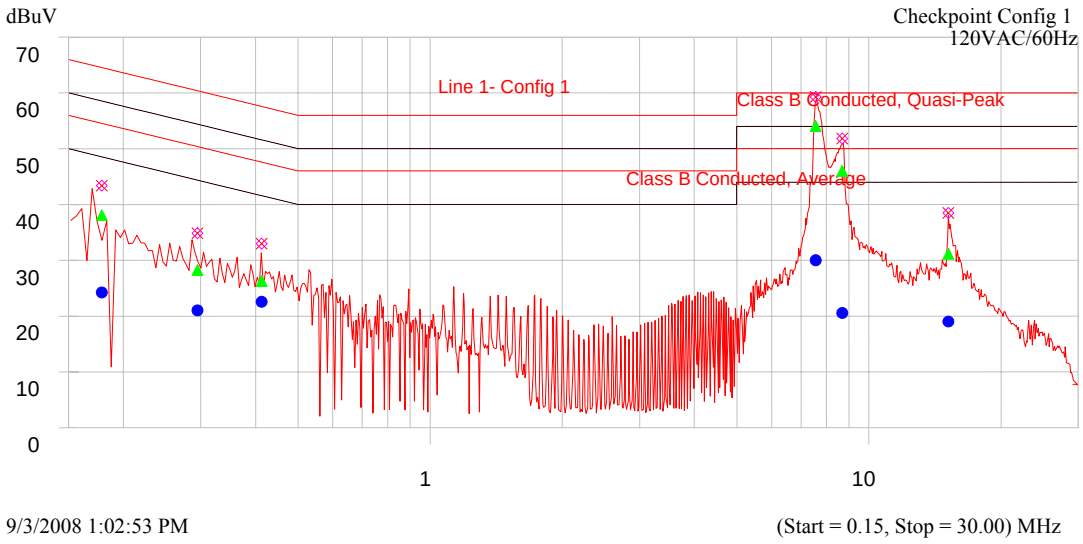
Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.237	37.8	31.1	-31.1	16.6	-35.6	Neutral - Config 1
0.710	25.6	16.8	-39.2	13.2	-32.8	Neutral - Config 1
3.190	25.1	23.8	-32.2	19.4	-26.6	Neutral - Config 1
7.600	60.4	55.2	-4.8	32.3	-17.7	Neutral - Config 1
8.698	52.6	46.9	-13.1	21.5	-28.5	Neutral - Config 1
15.184	39.0	31.9	-28.1	18.7	-31.3	Neutral - Config 1

NOTES:

Conducted Emissions @ 120V/60Hz

Line / Neutral

Line 1- Configuration 1



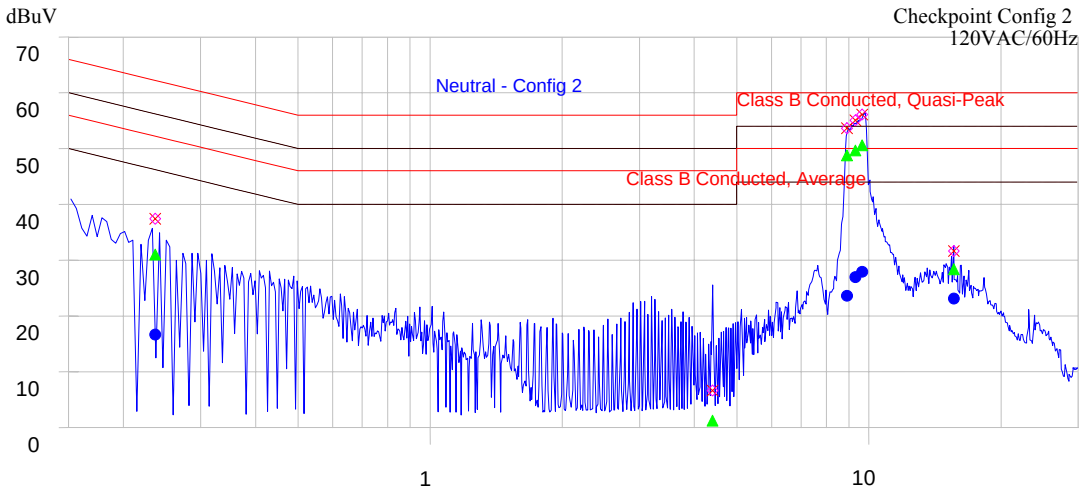
Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.179	43.4	38.1	-26.5	24.2	-30.3	Line 1- Config 1
0.295	34.8	28.2	-32.1	21.0	-29.4	Line 1- Config 1
0.413	33.0	26.3	-31.3	22.5	-25.0	Line 1- Config 1
7.568	59.3	54.1	-5.9	30.0	-20.0	Line 1- Config 1
8.699	51.8	46.0	-14.0	20.5	-29.5	Line 1- Config 1
15.185	38.5	31.2	-28.8	19.0	-31.0	Line 1- Config 1

NOTES:

Conducted Emissions @ 120V/60Hz

Line / Neutral

Neutral - Config 2



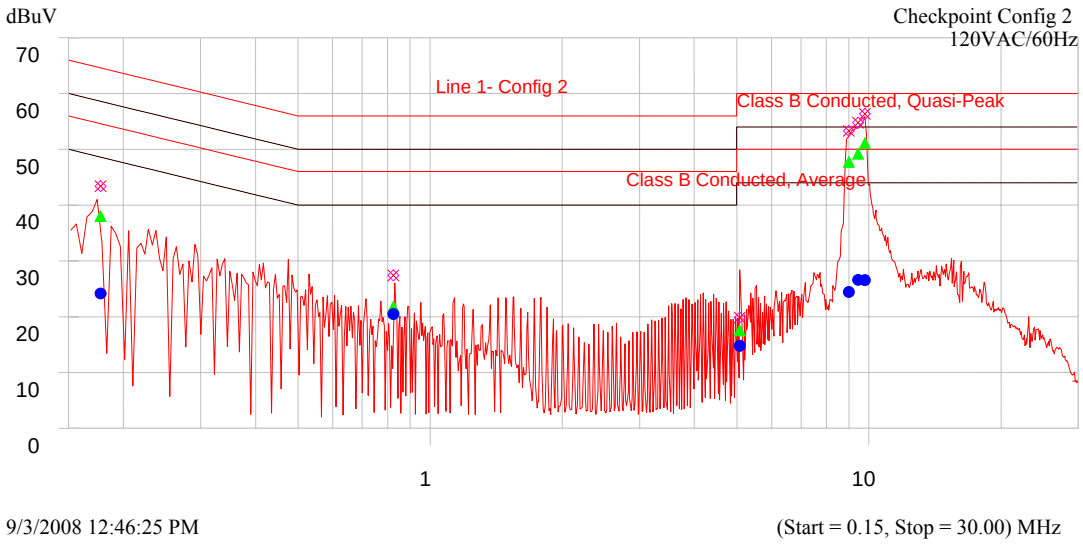
Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.237	37.4	31.0	-31.2	16.6	-35.6	Neutral - Config 2
4.404	6.6	1.2	-54.8	-5.0	-51.0	Neutral - Config 2
8.915	53.6	48.8	-11.2	23.6	-26.4	Neutral - Config 2
9.318	55.0	49.6	-10.4	27.0	-23.0	Neutral - Config 2
9.662	56.1	50.6	-9.4	27.9	-22.1	Neutral - Config 2
15.617	31.6	28.4	-31.6	23.1	-26.9	Neutral - Config 2

NOTES:

Conducted Emissions @ 120V/60Hz

Line / Neutral

Line 1- Config 2



Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.178	43.4	38.0	-26.6	24.2	-30.4	Line 1- Config 2
0.825	27.4	21.7	-34.3	20.5	-25.5	Line 1- Config 2
5.080	19.8	17.5	-42.5	14.8	-35.2	Line 1- Config 2
9.003	53.3	47.7	-12.3	24.4	-25.6	Line 1- Config 2
9.455	54.8	49.2	-10.8	26.6	-23.4	Line 1- Config 2
9.800	56.3	51.1	-8.9	26.5	-23.5	Line 1- Config 2

Appendix A

5 Test Plan

This test report is intended to follow this test plan outlined here in unless other wise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

5.1 General Information

Client	Checkpoint Systems Inc.
Address	101 Wolf Drive, P.O. Box 188
Address	Thorofare, NJ 08086
Contact Person	Gregory Sleet
Telephone	856-384-2339
Fax	800-257-5540
e-mail	greg.sleet@checkpt.com

5.2 Model(s) Name

Liberty PX

5.3 Type of Product

Electronic Article Surveillance Detection System

5.4 Equipment Under Test (EUT) Description

The liberty PX system is an Electronic Article Surveillance System (EAS). The systems detect target tags attached to merchandise. The target tags resonate in the region of 8.2 to 9.5 MHz. When the article of merchandise is purchased the target tag is deactivated which causes it to no longer resonate.

5.5 Test Software

The software used to setup and operate the EUT is PDA Assisted Service System (PASS) version 1.30 for Checkpoint System, Inc.

The settings for the output power for the 8.2 MHz and the 9.5 MHz bands were as follows

TX1 – 22

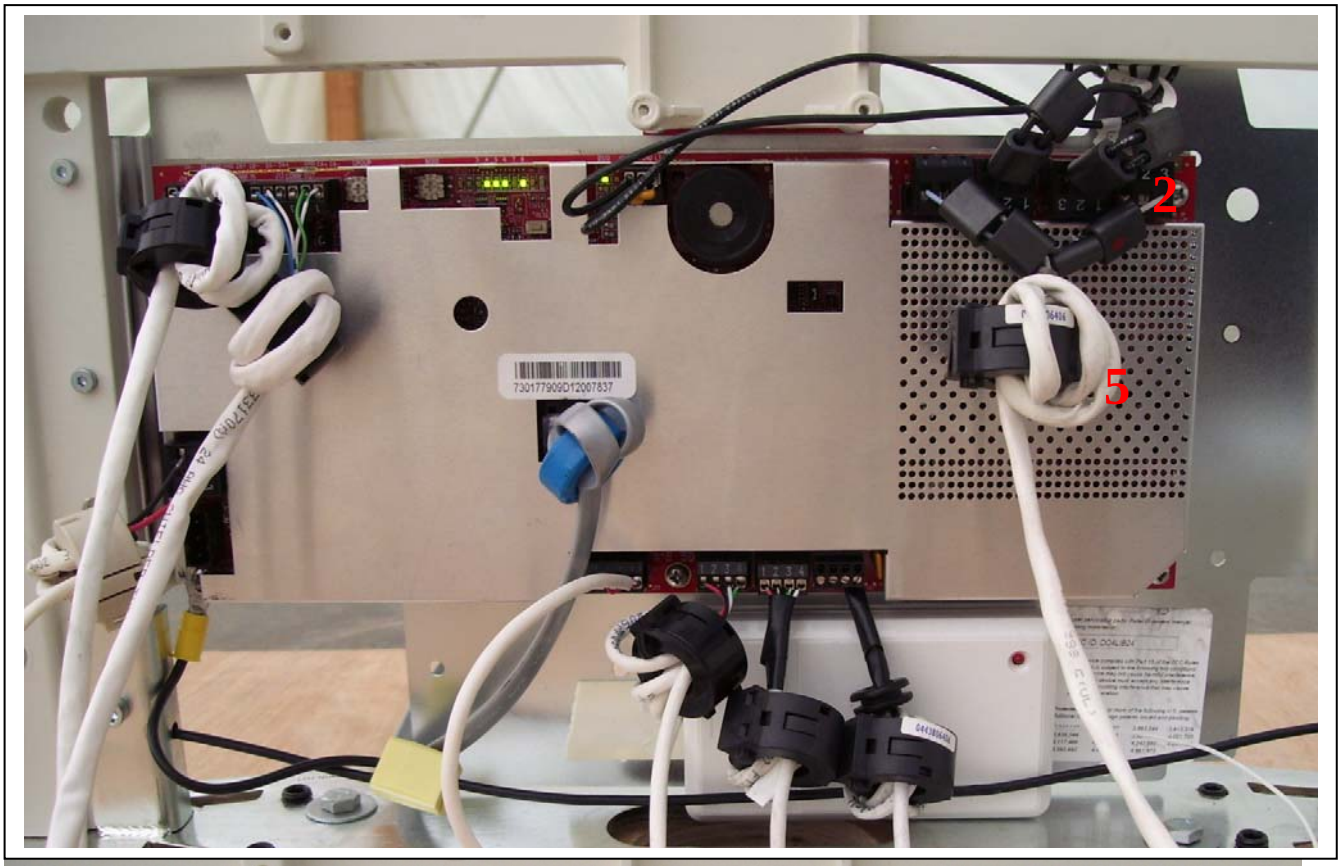
TX2 – 22

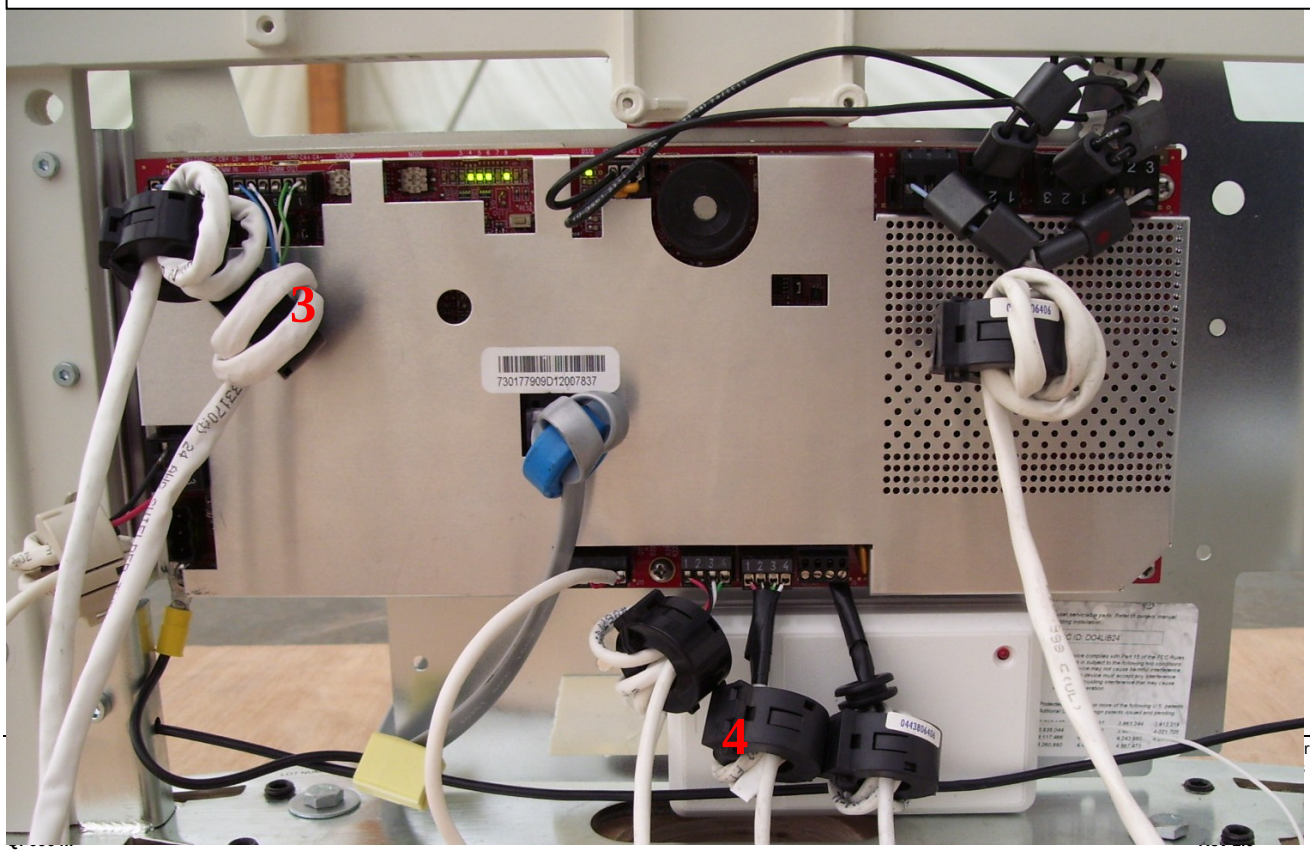
5.6 Modifications

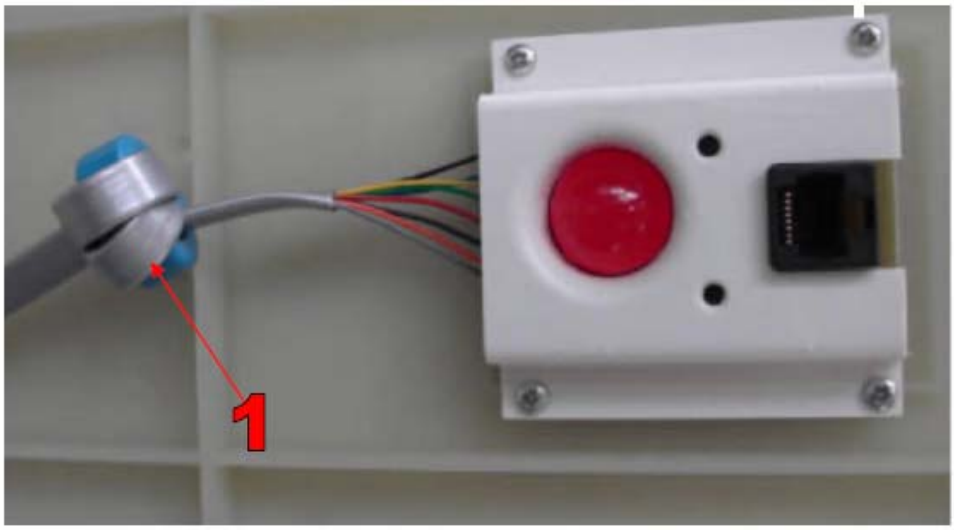
The following is the accumulated list of ferrites needed to comply with radiated emissions measurements.

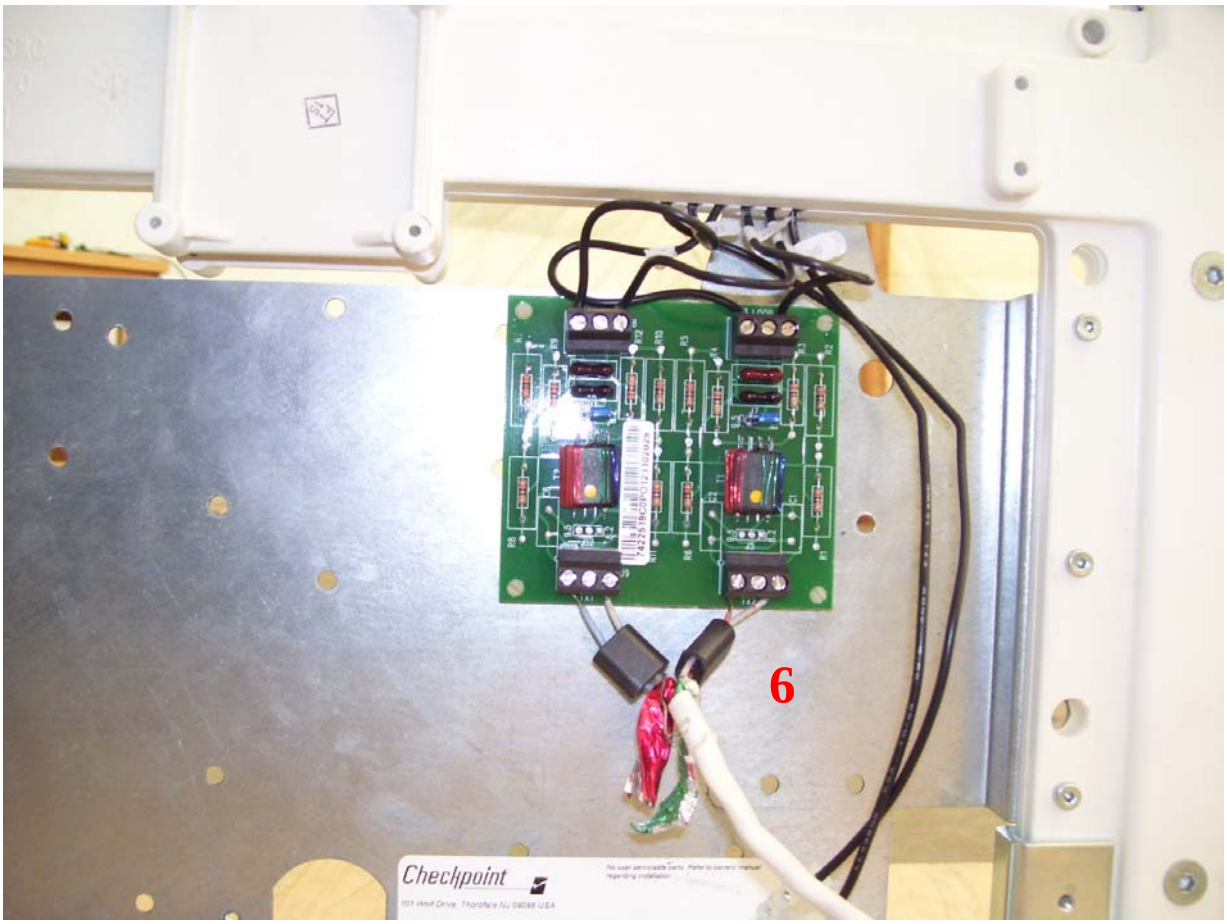
FERRITE LOCATIONS

1. Checkpoint P/N 7118986 (Fair Rite Order No B64290-L618-X35) – Add a ferrite on the end of the badge board cable with three turns.
2. Checkpoint P/N 734020 (Fair Rite Order No 2865-000-202) – Add 2 ferrites on the end of the Tx1, Tx2, RX3 and RX4 connection with one turn.
3. Checkpoint P/N 284760 (Fair Rite Order No 0443806406) – Add a ferrite on each data communication cables with four turns.
4. Checkpoint P/N 284760 (Fai Rite Order No 0443806406) – Add a ferrite on each sync cable with three turns.
5. Checkpoint P/N 284760 (Fair Rite Order No 0443806406) – Add a ferrite on interpedestal cable (from PAB to SAB) with four turns.
6. Checkpoint P/N 734020 (Fair Rite Order No 2865-000-202) one turn installed on the interpedestal cable leads (SAB side).


2
5


3
4





5.7 EUT Modes of Operation

The systems detect target tags attached to merchandise. The target tags resonate in the region of 8.2 to 9.5 MHz. When the article of merchandise is purchased the target tag is deactivated which causes it to no longer resonate. The tags were secured to a stick that was attached to an oscillating fan, and when the fan was on, the tags would move in and out of the field causing an alarm, which would in turn cause a intentional transmission.

5.8 Monitoring of EUT during Testing

The EUT when activated has an audible alarm as well as a visual alarm in the form of red blinking lights on the antenna uprights. While in a chamber the EUT was monitored via remote camera.

5.9 EUT Configuration

Configuration	Description
1	Liberty PX at 8.2 MHz and MCT-100 Transmitter at 315 MHz
2	Liberty PX at 9.5 MHz and MCT-100 Transmitter at 315 MHz
3	Liberty PX at 8.2 MHz and WT-100 Transmitter at 315 MHz
4	Liberty PX at 9.5 MHz and WT-100 Transmitter at 315 MHz
Notes	All configurations are the same except as noted above